

CLAIMS

~~Therefore, having thus described the invention, at least the following is claimed:~~

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1. A personal communications device comprising:
a telecommunications unit;
a global positioning systems (GPS) receiver; and
a clock source for providing a clock signal to the global positioning receiver
and the telecommunications unit.
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2. A personal communications device according to claim 1 wherein the
clock source provides a common clock signal to the global positioning receiver and
the telecommunications unit.
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3. A personal communications device according to claim 1 wherein the
telecommunications device comprises a CDMA based telecommunications device.
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4. A personal communications device according to claim 3 wherein the
telecommunications unit communications comprises the clock source.
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5. A personal communications device according to claim 4 wherein the
clock source comprises a crystal oscillator.
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6. A personal communications device according to claim 4 wherein the
GPS receiver comprises a voltage controlled oscillator for generating a system clock
signal based upon the clock source, and a feedback loop for controlling the voltage
controlled oscillator.

1 7. A personal communications device according to claim 6 wherein the
2 feedback loop comprises a frequency synthesizer for producing a feedback signal, a
3 phase comparator for generating a control signal in accordance with the feedback
4 signal and the common clock source signal and a loop filter for processing the control
5 signal and outputting it to the voltage controlled oscillator.

1 8. A personal communications device according to claim 7 wherein the
2 frequency synthesizer comprises:
3 a controlled oscillator having a variable output controlled by an input signal;
4 a frequency divider coupled to receive the output of the controlled oscillator
5 and responsive to the output to provide a frequency divided output signal;
6 a phase compensation circuit coupled to receive the frequency divided output
7 signal from the frequency divider, the phase compensation circuit responsive to the
8 frequency divided output signal to provide an output which compensates for phase lag
9 of the frequency divided output of the frequency divider; and
10 a phase detector coupled to receive frequency and to output a signal
11 proportional to the difference in phase between the two inputs to control the
12 controlled oscillator.

1 9. The personal communications device of claim 8 wherein the divider is
2 a fractional-N divider.

1 10. The personal communications device of claim 8 wherein the controlled
2 oscillator is a voltage controlled oscillator.

1 11. The personal communications device of claim 8 further comprising a
2 switch for selectably engaging the feedback loop to control the voltage controlled
3 oscillator.

1 12. The personal communications device of claim 11 wherein the switch is
2 permanently set during manufacture.

1 13. A method of clocking GPS receiver operations comprising the steps of:
2 receiving a clock signal from a clock source;
3 generating a control voltage for controlling the frequency of an oscillator
4 signal generated by a voltage controlled oscillator based upon a feedback signal from
5 a frequency synthesizer; and
6 generating a system clock signal of a particular frequency in response to the
7 control voltage.

1 14. A method of clocking GPS receiver operations according to claim 13
2 wherein the clock source comprises a crystal oscillator of a telecommunication unit.

1 15. A method of clocking GPS receiver operations according to claim 13
2 wherein the telecommunications unit comprises a CDMA based telecommunications
3 unit.

1 16. A method of clocking GPS receiver operations according to claim 13
2 wherein the frequency synthesizer generates the feedback signal in accordance with
3 the following steps:
4 receiving the system clock signal;
5 frequency dividing the system clock signal by at least two integer values to
6 generates a fractional-N divider signal over a discreet time period;
7 generating a variably delayed signal based upon the fractional-N divided
8 signal, wherein the variable delay compensates for phase delays of the fractional-N
9 divided signal within the discreet time period; and
10 comparing the phase of the variably delayed signal and a reference signal and
11 varying the system clock signal according to the difference.

1 17. A personal communications device comprising:
2 means for receiving a telecommunication signal;
3 means for receiving a global positioning system (GPS) signal; and
4 means for generating a clock source signal to be provided to the means for
5 receiving a global positioning system (GPS) signal and the means for receiving a
6 telecommunications signal.

1 18. A personal communications device according to claim 17 wherein the
2 means for receiving a telecommunications signal comprises a code division multiple
3 access (CDMA) based radio frequency receiver.

1 19. A personal communications device according to claim 17 wherein the
2 means for receiving a GPS signal comprises an oscillator for generating a GPS system
3 clock signal and a feedback loop for generating and providing a control signal to the
4 oscillator.

1 20. A personal communications device according to claim 19 wherein the
2 feedback loop comprises a frequency synthesizer for generating a feedback signal, a
3 phase comparator for generating a control signal in accordance with the feedback
4 signal and the common clock signal.

1 21. A personal communications device according to claim 19 wherein the
2 means for generating a clock source signal comprises a crystal oscillator within the
3 means for receiving a telecommunications signal.

1 22. A personal communications device comprising:
2 a telecommunications unit;
3 a global positioning systems (GPS) receiver comprising a first antenna for
4 receiving GPS signals; a downconverter coupled to the first antenna, the first antenna
5 providing the GPS signals to the downconverter; a local oscillator coupled to the
6 downconverter, the local oscillator providing a first reference signal to the
7 downconverter to convert the GPS signals from a first frequency to a second
8 frequency; a second antenna for receiving a precision carrier frequency signal from a
9 source providing the precision carrier frequency signal; an automatic frequency
10 control (AFC) circuit coupled to the second antenna, the AFC circuit providing a
11 second reference signal to the local oscillator to calibrate the first reference signal of
12 the local oscillator, wherein the local oscillator is used to acquire the GPS signals;
13 and
14 the local oscillator signal is provided to the global positioning receiver and the
15 telecommunications unit.

1 23. A personal communications device comprising:
2 a telecommunications unit;
3 a global positioning systems (GPS) receiver comprising a first antenna for
4 receiving GPS signals; a downconverter coupled to the first antenna, the first antenna
5 providing the GPS signals to the downconverter, the downconverter having an input
6 for receiving a local oscillator signal to convert the GPS signals from a first frequency
7 to a second frequency; a second antenna for receiving a precision carrier frequency
8 signal from a source providing the precision carrier frequency signal; an automatic
9 frequency control (AFC) circuit coupled to the second antenna, the AFC circuit being
10 coupled to the downconverter to provide the local oscillator signal which is used to
11 acquire the GPS signals; and
12 the local oscillator signal is provided to the global positioning receiver and the
13 telecommunications unit.

1 24. personal communications device comprising:
2 a telecommunications unit;
3 a GPS receiver comprising a GPS antenna for receiving data representative of
4 GPS signals from at least one satellite; a digital processor coupled to the GPS
5 antenna, the digital processor processing the data representative of GPS signals from
6 at least one satellite, including performing a matched filtering operation to determine
7 a pseudorange based on the data representative of GPS signals, the digital processor
8 also processing communication signals received through a communication link, the
9 processing of communication signals comprising demodulation of communication
10 signals sent to the GPS receiver; and
11 a clock source for providing a clock signal to the GPS receiver and the
12 telecommunications unit.

1 25. A personal communications device comprising:
2 a telecommunications unit;
3 a GPS receiver comprising a frequency tolerant wireless transceiver to receive
4 and transmit on the wireless signal energy on the same frequency and to automatically
5 adjust to that frequency, wherein the transceiver comprises: an antenna to receive a
6 wireless data signal, including application data from one or more remote transceivers,
7 at an actual frequency and issue this signal as a conducted radio frequency (RF) data
8 signal and to transmit a wireless return signal at the actual frequency to the remote
9 transceiver in response to a conducted RF return signal; a synthesizer to generate a
10 local oscillator (LO) signal sequentially in response to a first and a second frequency
11 control signal, and to generate the RF return signal at the actual frequency in response
12 to the second frequency control signal and having modulation in response to a digital
13 return signal; a direct conversion receiver to receive the LO signal to down convert
14 the RF data signal to a baseband data signal; a frequency discriminator to receive the
15 baseband data signal, to provide a frequency difference signal for the current
16 frequency difference between the expected frequency and the actual frequency, and to
17 demodulate the baseband data signal, and to issue a demodulated data signal; a
18 microcontroller system having a receive adjust mode to provide the first frequency
19 control signal predictive of an expected frequency and to receive the frequency
20 difference signal, having a receive data mode to process the frequency difference
21 signal, to provide the second frequency control signal predictive of the actual
22 frequency, and to receive the demodulated data signal, including the application data,
23 and to provide the digital return signal; and
24 the local oscillator signal is provided to the global positioning receiver and the
25 telecommunications unit.

1 26. A personal communications device comprising:
2 a telecommunications unit;
3 a GPS receiver comprising a frequency tolerant transceiver to automatically
4 adjust to receive a radio frequency (RF) data signal on an actual frequency and to
5 transmit an RF return signal on that same frequency, wherein the transceiver
6 comprises: a synthesizer for sequentially generating a local oscillator (LO) signal and
7 the RF return signal, the LO signal sequentially having a first frequency
8 corresponding to an expected frequency of the RF data signal and a second frequency
9 corresponding to the actual frequency of the RF data signal in response to a first and
10 a second frequency control signal, respectively, the RF return signal having the
11 second frequency in response to the second frequency control signal;
12 a microcontroller system having a receive adjust mode for providing the first
13 frequency control signal predictive of the expected frequency and providing the
14 second frequency control signal for the actual frequency based upon a frequency
15 difference between the actual frequency and the expected frequency; and
16 the local oscillator signal is provided to the global positioning receiver and the
17 telecommunications unit.